

## **RS-002, “PROCESSING APPLICATIONS FOR EARLY SITE PERMITS”**

### **ATTACHMENT 2**

#### **2.2.3 EVALUATION OF POTENTIAL ACCIDENTS**

##### **REVIEW RESPONSIBILITIES**

Primary - Probabilistic Safety Assessment Branch (SPSB)

Secondary - None

##### **I. AREAS OF REVIEW**

For an early site permit (ESP) application, the applicant's identification of potential accident situations on site and in the vicinity of the site is reviewed to determine its completeness as well as the bases upon which these potential accidents may need to be considered in the design of a nuclear power plant or plants of specified type (or falling within a plant parameter envelope [PPE]) that might be constructed on the proposed site. (See Sections 2.2.1 and 2.2.2 of this review standard.)

With respect to potential accidents on or in the vicinity of the site which could affect control room habitability (e.g., toxic gases, asphyxiants), those accidents which are to be accommodated on a design basis, as determined within the review conducted using Section 2.2.3 of this review standard, will need to be addressed within the design of the nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site and reviewed at the combined license (COL) stage (if the information is not available at the ESP stage) using NUREG-0800 Section 6.4.

The applicant's probability analyses of potential accidents involving hazardous materials or activities on site and in the vicinity of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site, if such analyses have been performed, are reviewed to determine that appropriate data and analytical models have been utilized.

The analyses of the consequences of accidents involving nearby industrial, military, and transportation facilities are reviewed to determine if any of them need to be identified as design basis events.

##### **II. ACCEPTANCE CRITERIA**

The SPSB acceptance criteria are based on meeting the relevant requirements of 10 CFR 52.17, 10 CFR 100.20, and 10 CFR 100.21 as they relate to the factors to be considered in the evaluation of sites. These requirements stipulate that individual and societal risk of potential plant accidents must be low.

Specific criteria necessary to meet the relevant requirements of 10 CFR 100.20 and 100.21 are described in the following paragraphs.

Offsite and onsite hazards which have the potential for causing onsite accidents leading to the release of significant quantities of radioactive fission products, and thus pose an undue risk of

public exposure, should have a sufficiently low probability of occurrence and be within the scope of the low probability of occurrence criterion of 10 CFR 100.20. Specific guidance with respect to offsite hazards is provided in Chapter 2, Section 2.2.3, of Regulatory Guide (RG) 1.70 (Ref. 3). As indicated therein, the identification of design basis events resulting from the presence of hazardous materials or activities on site and in the vicinity of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site is acceptable if the design basis events include each postulated type of accident (as discussed in Subsection III below) for which the expected rate of occurrence of potential exposures in excess of the 10 CFR 100.21 guidelines is estimated to exceed the NRC staff objective of approximately  $10^{-7}$  per year. Because of the difficulty of assigning accurate numerical values to the expected rate of unprecedented potential hazards generally considered in this section of this review standard, judgment must be used as to the acceptability of the overall risk presented.

The probability of occurrence of initiating events having the potential for causing consequences in excess of 10 CFR Part 100 exposure guidelines should be estimated using assumptions that are as representative of the specific site as is practicable. In the absence of a specific plant design, past review experience of existing plants and judgment should be factored into the determination of the need for identifying a site hazard as a design basis event. In addition, because of the low probabilities of the events under consideration, data are often not available to permit accurate calculation of probabilities. Accordingly, the expected rate of occurrence of an initiating event of approximately  $10^{-6}$  per year is acceptable if, when combined with reasonable qualitative arguments, the realistic probability can be shown to be lower.

### III. REVIEW PROCEDURES

In some cases it may be necessary to consult with or obtain specific data from other branches, such as the Materials and Chemical Engineering Branch (EMCB), the Mechanical and Civil Engineering Branch (EMEB), or the Plant Systems Branch (SPLB), regarding analyses of site hazards and/or their possible effects on structures or components of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site.

The applicant's probability calculations are reviewed, and an independent probability analysis is performed by the staff if the potential hazard is considered significant enough to affect the licenseability of the site or is important to the identification of design basis events.

All stochastic variables that affect the occurrence or severity of the postulated event are identified and judged to be either independent or conditioned by other variables.

Probabilistic models should be tested, where possible, against all available information. If the model or any portion of it, by simple extension, can be used to predict an observable accident rate, this test should be performed.

The design parameters (e.g., overpressure) and physical phenomena (e.g., gas concentration) selected by the applicant for each design basis event are reviewed to ascertain that the values are comparable to the values used in previous analyses and found to be acceptable by the staff.

If accidents involving release of smoke, flammable or nonflammable gases, or toxic chemical bearing clouds are considered to be design basis events, then, for a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site,

an evaluation of the effects of these accidents on control room habitability will need to be made in accordance with NUREG-0800 Section 6.4 and on the operation of diesels and other safety-related equipment in accordance with NUREG-0800 Chapter 9. If the design details necessary for this evaluation are not available at the ESP stage, the evaluation will need to be done at the COL stage.

Similarly, special attention should be given to the review of a site where several sources of a particular type of manmade hazard are identified, but none of which, individually, has a probability exceeding the acceptance criteria stated herein. The objective of this should be to estimate the aggregate probability of an outcome. (A hypothetical example is a situation where the probability of a significant shock wave is about  $10^{-7}$  per reactor year from accidents at a nearby industrial facility, and approximately equal probabilities from railway accidents, highway accidents, and shipping accidents. Individually each may be judged acceptably low; the aggregate probability may be judged sufficiently great that it would be identified as a design basis event.)

#### IV. EVALUATION FINDINGS

If the reviewer, after a review of the onsite and offsite hazards identified in Section 2.2.1/2.2.2 of this review standard and evaluated in the above section of this review standard, concludes that there are no identifiable design basis events, then the staff concludes that the site is acceptable for siting a nuclear power plant or plants of specified type (or falling within the PPE submitted by the applicant). If one or more design basis events are identified with respect to the site, then the site may be found to be acceptable if the design of a nuclear power plant or plants of specified type (or falling within the applicant's PPE) that might be constructed on the proposed site is shown to adequately accommodate their effects, such that the probability of exceeding the 10 CFR Part 100 dose guidelines is within the acceptance criteria of Section 2.2.3 of this review standard. A conclusion of the following type may be prepared for the staff's Safety Evaluation Report.

As set forth above, the applicant has identified potential accidents related to the presence of hazardous materials or activities on site and in the site vicinity which could affect a nuclear power plant of type specified by the applicant, and from these the applicant has selected those which, in accordance with the relevant requirements of 10 CFR Part 100, should be considered as design basis events at the combined license (COL) stage. Therefore, the staff concludes that the site location is acceptable with regard to potential accidents that could affect a nuclear power plant of type specified by the applicant [or falling within the PPE submitted by the applicant] that might be constructed on the site and meets the relevant requirements of 10 CFR Part 52.

#### V. IMPLEMENTATION

The following provides guidance to applicants and licensees regarding the NRC staff's plan for using this section of this review standard.

This section will be used by the staff when performing safety evaluations of ESP applications submitted by applicants pursuant to 10 CFR Part 52. Except in those cases in which the applicant proposes an acceptable alternate method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

VI. REFERENCES

1. 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."
2. 10 CFR Part 100, "Reactor Site Criteria."
3. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."
4. Affidavit of Jacques B. J. Read before the Atomic Safety and Licensing Board in the matter of Skagit Nuclear Power Project, Units 1 and 2, July 15, 1976. Docket Nos. STN 50-522, 523.
5. Atomic Safety and Licensing Board, Supplemental Initial Decision in the Matter of Hope Creek Generating Station, Units 1 and 2, March 28, 1977. Docket Nos. 50-354, 355.
6. Section 2, Supplement 2 to the Floating Nuclear Plant Safety Evaluation Report, Docket No. STN 50-437, September 1976.